

# A dual algorithm for the constrained shortest path problem

Networks

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Citation Report

#	ARTICLE	IF	CITATIONS
1	Some reliability routing problems in an acyclic directed network with stochastic terminal node. <i>Microelectronics Reliability</i> , 1982, 22, 31-41.	0.9	0
2	An Integer Programming Procedure for Assembly System Design Problems. <i>Operations Research</i> , 1983, 31, 522-545.	1.2	112
3	Plus court chemin avec contraintes d'horaires. <i>RAIRO - Operations Research</i> , 1983, 17, 357-377.	1.0	49
4	Operation Sequence Planning Using Optimization Concepts and Logic Programming. IFAC Postprint Volumes IPPV / International Federation of Automatic Control, 1984, 17, 2517-2520.	0.4	1
5	â€œMultidimensionalâ€™ extensions and a nested dual approach for the m-median problem. <i>European Journal of Operational Research</i> , 1985, 21, 121-137.	3.5	68
6	A heuristic approach to hard constrained shortest path problems. <i>Discrete Applied Mathematics</i> , 1985, 10, 125-137.	0.5	25
7	The shortest path problem with two objective functions. <i>European Journal of Operational Research</i> , 1986, 25, 281-291.	3.5	149
8	Approximation of Pareto Optima in Multiple-Objective, Shortest-Path Problems. <i>Operations Research</i> , 1987, 35, 70-79.	1.2	257
9	Lagrangean decomposition: A model yielding stronger lagrangean bounds. <i>Mathematical Programming</i> , 1987, 39, 215-228.	1.6	335
10	The Minimum-Covering/Shortest-Path Problem. <i>Decision Sciences</i> , 1988, 19, 490-503.	3.2	37
11	Optimal Obnoxious Paths on a Network: Transportation of Hazardous Materials. <i>Operations Research</i> , 1988, 36, 84-92.	1.2	209
12	A Generalized Permanent Labelling Algorithm For The Shortest Path Problem With Time Windows. <i>Infor</i> , 1988, 26, 191-212.	0.5	221
13	Solving k-shortest and constrained shortest path problems efficiently. <i>Annals of Operations Research</i> , 1989, 20, 249-282.	2.6	39
14	An application-oriented guide for designing Lagrangean dual ascent algorithms. <i>European Journal of Operational Research</i> , 1989, 43, 197-205.	3.5	39
15	An algorithm for the resource constrained shortest path problem. <i>Networks</i> , 1989, 19, 379-394.	1.6	247
16	Technical Noteâ€”An Improved Dual Based Algorithm for the Generalized Assignment Problem. <i>Operations Research</i> , 1989, 37, 658-663.	1.2	69
17	The Constrained Bottleneck Problem in Networks. <i>Operations Research</i> , 1990, 38, 178-181.	1.2	46
18	An interactive approach to identify the best compromise solution for two objective shortest path problems. <i>Computers and Operations Research</i> , 1990, 17, 187-198.	2.4	55

#	ARTICLE	IF	CITATIONS
19	A network model for the rotating workforce scheduling problem. <i>Networks</i> , 1990, 20, 25-42.	1.6	64
20	An application of lagrangean decomposition to the resource-constrained minimum weighted arborescence problem. <i>Networks</i> , 1990, 20, 345-359.	1.6	20
21	Matching problems with generalized upper bound side constraints. <i>Networks</i> , 1990, 20, 703-721.	1.6	16
22	The equity constrained shortest path problem. <i>Computers and Operations Research</i> , 1990, 17, 297-307.	2.4	39
23	Modeling Equity of Risk in the Transportation of Hazardous Materials. <i>Operations Research</i> , 1990, 38, 961-973.	1.2	100
24	Risk Criteria in a Stochastic Knapsack Problem. <i>Operations Research</i> , 1990, 38, 820-825.	1.2	81
25	Resource-constrained search. , 0, , .		1
26	Minimum fragmentation internetwork routing. , 1991, , .		1
27	Optimal Simplification of Cartographic Lines Using Shortest-Path Formulations. <i>Journal of the Operational Research Society</i> , 1991, 42, 793.	2.1	0
28	Optimal Simplification of Cartographic Lines Using Shortest-path Formulations. <i>Journal of the Operational Research Society</i> , 1991, 42, 793-802.	2.1	4
29	An improved bounding procedure for the constrained assignment problem. <i>Computers and Operations Research</i> , 1991, 18, 531-535.	2.4	3
30	Applications of the parametric programming procedure. <i>European Journal of Operational Research</i> , 1991, 54, 66-73.	3.5	3
31	Parametric programming and Lagrangian relaxation: The case of the network problem with a single side-constraint. <i>Computers and Operations Research</i> , 1991, 18, 129-140.	2.4	13
32	Integrating quantitative and qualitative aspects of digital line simplification. <i>Cartographic Journal</i> , 1992, 29, 25-30.	0.8	17
33	Approximation Schemes for the Restricted Shortest Path Problem. <i>Mathematics of Operations Research</i> , 1992, 17, 36-42.	0.8	461
34	Network reduction for the acyclic constrained shortest path problem. <i>European Journal of Operational Research</i> , 1992, 63, 124-132.	3.5	8
35	The knapsack problem with disjoint multiple-choice constraints. <i>Naval Research Logistics</i> , 1992, 39, 213-227.	1.4	9
36	An algorithm for the ranking of shortest paths. <i>European Journal of Operational Research</i> , 1993, 69, 97-106.	3.5	167

#	ARTICLE	IF	CITATIONS
37	A parametric programming methodology to solve the lagrangian dual for network problems with multiple side-constraints. Computers and Operations Research, 1993, 20, 541-552.	2.4	3
38	A network-based model for transporting extremely hazardous materials. Operations Research Letters, 1993, 13, 85-93.	0.5	51
39	Efficient Interactive Methods for a Class of Multiattribute Shortest Path Problems. Management Science, 1994, 40, 891-897.	2.4	16
40	The Variance-Constrained Shortest Path Problem. Transportation Science, 1994, 28, 309-316.	2.6	80
41	Chapter 7 A survey of computational geometry. Handbooks in Operations Research and Management Science, 1995, , 425-479.	0.6	3
42	A route pre-computation algorithm for integrated services networks. Journal of Network and Systems Management, 1995, 3, 427-449.	3.3	16
43	A constrained Steiner tree problem. European Journal of Operational Research, 1995, 81, 430-439.	3.5	13
44	Multiobjective routing problems. Top, 1995, 3, 167-220.	1.1	27
45	The resource constrained shortest path problem implemented in a lazy functional language. Journal of Functional Programming, 1996, 6, 29-46.	0.5	0
47	Process Planning for Aluminum Tubes: An Engineering-Operations Perspective. Operations Research, 1996, 44, 7-20.	1.2	25
48	Two engineering applications of a constrained shortest-path model. European Journal of Operational Research, 1997, 103, 426-438.	3.5	16
49	Optimisation algorithms for ECG data compression. Medical and Biological Engineering and Computing, 1997, 35, 420-424.	1.6	19
50	Lower bound for multimedia multicast routing. IET Communications, 1998, 145, 87.	1.0	4
51	Shortest Path Algorithms In Transportation Models: Classical and Innovative Aspects. , 1998, , 245-281.		147
52	A Bibliographical Survey On Some Well-Known Non-Standard Knapsack Problems. Infor, 1998, 36, 274-317.	0.5	54
53	Lagrangean/surrogate relaxation for generalized assignment problems. European Journal of Operational Research, 1999, 114, 165-177.	3.5	76
54	An interactive bi-objective shortest path approach: searching for unsupported nondominated solutions. Computers and Operations Research, 1999, 26, 789-798.	2.4	63
55	A Column-Generation Approach for the Assembly System Design Problem with Tool Changes. Flexible Services and Manufacturing Journal, 1999, 11, 177-205.	0.4	34

#	ARTICLE	IF	CITATIONS
56	Path problems in networks with vector-valued edge weights. <i>Networks</i> , 1999, 34, 19-35.	1.6	6
57	An orthogonal genetic algorithm for multimedia multicast routing. <i>IEEE Transactions on Evolutionary Computation</i> , 1999, 3, 53-62.	7.5	224
58	A Maritime Global Route Planning Model for Hazardous Materials Transportation. <i>Transportation Science</i> , 1999, 33, 34-48.	2.6	45
59	Spatial decision support system for hazardous material truck routing. <i>Transportation Research Part C: Emerging Technologies</i> , 2000, 8, 337-359.	3.9	66
60	Design and development of interactive trip planning for web-based transit information systems. <i>Transportation Research Part C: Emerging Technologies</i> , 2000, 8, 409-425.	3.9	74
61	Nonadditive Shortest Paths: Subproblems in Multi-Agent Competitive Network Models. <i>Computational and Mathematical Organization Theory</i> , 2000, 6, 29-45.	1.5	16
62	Geometric Shortest Paths and Network Optimization. , 2000, , 633-701.		211
63	Resource Constrained Shortest Paths. <i>Lecture Notes in Computer Science</i> , 2000, , 326-337.	1.0	63
64	An efficient algorithm for finding a path subject to two additive constraints. <i>Performance Evaluation Review</i> , 2000, 28, 318-327.	0.4	7
65	An efficient algorithm for finding a path subject to two additive constraints. , 2000, , .		39
66	SOLVING LARGE REPLACEMENT PROBLEMS WITH BUDGET CONSTRAINTS. <i>Engineering Economist</i> , 2000, 45, 290-308.	0.3	16
67	Computing Tools for Modeling, Optimization and Simulation. <i>Operations Research/ Computer Science Interfaces Series</i> , 2000, , .	0.3	5
68	Multi-constrained optimal path selection. , 0, , .		242
69	The freight routing problem of time-definite freight delivery common carriers. <i>Transportation Research Part B: Methodological</i> , 2001, 35, 525-547.	2.8	51
70	A randomized algorithm for finding a path subject to multiple QoS requirements. <i>Computer Networks</i> , 2001, 36, 251-268.	3.2	65
71	A Technical Review of Column Generation in Integer Programming. <i>Optimization and Engineering</i> , 2001, 2, 159-200.	1.3	78
72	Minimum Spanning Trees with Sums of Ratios. <i>Journal of Global Optimization</i> , 2001, 19, 103-120.	1.1	9
73	Algorithms for the Weight Constrained Shortest Path Problem. <i>International Transactions in Operational Research</i> , 2001, 8, 15-29.	1.8	50

#	ARTICLE	IF	CITATIONS
75	Identifying Multiple Reasonable Alternative Routes: Efficient Vector Labeling Approach. Transportation Research Record, 2002, 1783, 111-118.	1.0	9
76	The Quickest Multicommodity Flow Problem. Lecture Notes in Computer Science, 2002, , 36-53.	1.0	41
77	Approximation algorithms for multi-parameter graph optimization problems. Discrete Applied Mathematics, 2002, 119, 129-138.	0.5	1
78	Using logical surrogate information in Lagrangean relaxation: An application to symmetric traveling salesman problems. European Journal of Operational Research, 2002, 138, 473-483.	3.5	7
79	A penalty function heuristic for the resource constrained shortest path problem. European Journal of Operational Research, 2002, 142, 221-230.	3.5	16
80	Improved preprocessing, labeling and scaling algorithms for the Weight-Constrained Shortest Path Problem. Networks, 2003, 42, 135-153.	1.6	155
81	Search space reduction in QoS routing. Computer Networks, 2003, 41, 73-88.	3.2	33
82	Routing multimedia traffic with qos guarantees. IEEE Transactions on Multimedia, 2003, 5, 429-443.	5.2	38
83	A Multicommodity Network-Flow Problem with Side Constraints on Paths Solved by Column Generation. INFORMS Journal on Computing, 2003, 15, 42-57.	1.0	69
84	Resource Constrained Shortest Path Problems in Path Planning for Fleet Management. Mathematical Modelling and Algorithms, 2004, 3, 1-17.	0.5	17
85	An exact algorithm for the elementary shortest path problem with resource constraints: Application to some vehicle routing problems. Networks, 2004, 44, 216-229.	1.6	473
86	Dynamic programming algorithms for the elementary shortest path problem with resource constraints. Electronic Notes in Discrete Mathematics, 2004, 17, 247-249.	0.4	5
87	The primal simplex approach to the QoS routing problem. , 0, , .		4
88	Finding the K shortest hyperpaths. Computers and Operations Research, 2005, 32, 1477-1497.	2.4	47
89	Shorter Path Constraints for the Resource Constrained Shortest Path Problem. Lecture Notes in Computer Science, 2005, , 201-216.	1.0	11
90	Pareto Optimal Based Partition Framework for Two Additive Constrained Path Selection. Lecture Notes in Computer Science, 2005, , 318-325.	1.0	3
91	Multicriteria Analysis in Telecommunication Network Planning and Design " Problems and Issues. , 2005, , 899-941.		18
92	On the Complexity of Delaying an Adversary's Project. , 2005, , 3-17.		14

#	ARTICLE	IF	CITATIONS
94	Recent Advances in Multiobjective Optimization. Lecture Notes in Computer Science, 2005, , 45-47.	1.0	2
95	Advances in QoS Path(s) Selection Problem. , 0, , .		0
96	Path enumeration by finding the constrained K-shortest paths. Transportation Research Part B: Methodological, 2005, 39, 545-563.	2.8	91
97	Optimizing picking operations on dual-head placement machines. IEEE Transactions on Automation Science and Engineering, 2006, 3, 1-15.	3.4	17
98	Constrained shortest link-disjoint paths selection: a network programming based approach. IEEE Transactions on Circuits and Systems Part 1: Regular Papers, 2006, 53, 1174-1187.	0.1	19
99	Aircraft routing under the risk of detection. Naval Research Logistics, 2006, 53, 728-747.	1.4	67
100	QoS routing in communication networks: approximation algorithms based on the primal simplex method of linear programming. IEEE Transactions on Computers, 2006, 55, 815-829.	2.4	13
101	Nodal aggregation of resource constraints in a shortest path problem. European Journal of Operational Research, 2006, 172, 500-514.	3.5	10
102	A branch-and-price approach for operational aircraft maintenance routing. European Journal of Operational Research, 2006, 175, 1850-1869.	3.5	101
103	Global Optimality Conditions for Discrete and Nonconvex Optimizationâ€”With Applications to Lagrangian Heuristics and Column Generation. Operations Research, 2006, 54, 436-453.	1.2	18
104	FREIGHT TRAIN ROUTING AND SCHEDULING IN A PASSENGER RAIL NETWORK: COMPUTATIONAL COMPLEXITY AND THE STEPWISE DISPATCHING HEURISTIC. Asia-Pacific Journal of Operational Research, 2007, 24, 499-533.	0.9	16
105	Energy-efficient routing for signal detection under the Neyman-Pearson criterion in wireless sensor networks. , 2007, , .		6
106	Integrated Routing and Scheduling of Hazmat Trucks with Stops En Route. Transportation Science, 2007, 41, 107-122.	2.6	43
107	An improved solution algorithm for the constrained shortest path problem. Transportation Research Part B: Methodological, 2007, 41, 756-771.	2.8	74
108	Combinatorics, Algorithms, Probabilistic and Experimental Methodologies. Lecture Notes in Computer Science, 2007, , .	1.0	2
109	Energy-efficient Routing for Signal Detection under the Neyman-Pearson Criterion in Wireless Sensor Networks. , 2007, , .		5
110	A class of multicriteria shortest path problems for real-time in-vehicle routing. Canadian Journal of Civil Engineering, 2007, 34, 1096-1109.	0.7	4
111	Two additive-constrained path selection in the presence of inaccurate state information. Computer Communications, 2007, 30, 2096-2112.	3.1	4

#	ARTICLE	IF	CITATIONS
112	A model to optimize placement operations on dual-head placement machines. <i>Discrete Optimization</i> , 2007, 4, 232-256.	0.6	13
113	Three-stage approaches for optimizing some variations of the resource constrained shortest-path sub-problem in a column generation context. <i>European Journal of Operational Research</i> , 2007, 183, 564-577.	3.5	13
114	Cost-based Filtering for Shorter Path Constraints. <i>Constraints</i> , 2007, 12, 207-238.	0.4	12
115	An FPTAS for Quickest Multicommodity Flows with Inflow-Dependent Transit Times. <i>Algorithmica</i> , 2007, 47, 299-321.	1.0	7
116	New dynamic programming algorithms for the resource constrained elementary shortest path problem. <i>Networks</i> , 2008, 51, 155-170.	1.6	203
117	Lagrangian relaxation and enumeration for solving constrained shortest-path problems. <i>Networks</i> , 2008, 52, 256-270.	1.6	79
118	An integrated multi-objective model to determine the optimal rescue path and traffic controlled arcs for disaster relief operations under uncertainty environments. <i>Journal of Advanced Transportation</i> , 2008, 42, 493-519.	0.9	16
120	Mathematical Programming Algorithms for Two-Path Routing Problems with Reliability Considerations. <i>INFORMS Journal on Computing</i> , 2008, 20, 553-564.	1.0	19
121	Cooperative Particle Swarm Optimization for the Delay Constrained Least Cost Path Problem. <i>Lecture Notes in Computer Science</i> , 2008, , 25-35.	1.0	3
122	Multicast Routing Algorithm on the High Performance Computer Network. , 2009, , .		0
123	Technology and business practice adoption as a constrained shortest path problem. , 2009, , .		0
124	Simultaneous solution of Lagrangean dual problems interleaved with preprocessing for the weight constrained shortest path problem. <i>Networks</i> , 2009, 53, 358-381.	1.6	19
125	Developing work schedules for an inter-city transit system with multiple driver types and fleet types. <i>European Journal of Operational Research</i> , 2009, 192, 852-865.	3.5	24
126	Enabling flexibility on a dual head placement machine by optimizing platform-tray-feeder picking operations. <i>Flexible Services and Manufacturing Journal</i> , 2009, 21, 1-30.	1.9	6
127	A new model for path planning with interval data. <i>Computers and Operations Research</i> , 2009, 36, 1893-1899.	2.4	14
128	Optimum routing protection against cumulative eavesdropping in multihop wireless networks. , 2009, , .		3
129	Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems. <i>Lecture Notes in Computer Science</i> , 2009, , .	1.0	3
130	Multi-constrained path computation algorithms for Traffic Engineering over Wireless Mesh Networks. , 2009, , .		2



#	ARTICLE	IF	CITATIONS
131	A Methodology for Constraint-Driven Synthesis of On-Chip Communications. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2009, 28, 364-377.	1.9	17
132	Energy-Efficient Routing for Signal Detection in Wireless Sensor Networks. IEEE Transactions on Signal Processing, 2009, 57, 2050-2063.	3.2	43
133	Multi-Constrained Shortest Path Model and Solution with Improved Ant Colony Algorithm. , 2010, , .		0
134	Mathematical models and solution methods for optimal container terminal yard layouts. OR Spectrum, 2010, 32, 427-452.	2.1	46
135	Solving the constrained shortest path problem using random search strategy. Science China Technological Sciences, 2010, 53, 3258-3263.	2.0	4
136	Hybrid co-evolutionary particle swarm optimization and noising metaheuristics for the delay constrained least cost path problem. Journal of Heuristics, 2010, 16, 593-616.	1.1	6
137	Path optimization for the resourceâ€constrained searcher. Naval Research Logistics, 2010, 57, 422-440.	1.4	26
138	Two- and three-index formulations of the minimum cost multicommodity k-splittable flow problem. European Journal of Operational Research, 2010, 202, 82-89.	3.5	18
139	The pyramidal capacitated vehicle routing problem. European Journal of Operational Research, 2010, 205, 59-64.	3.5	10
140	Flexible solutions in disjunctive scheduling: General formulation and study of the flow-shop case. Computers and Operations Research, 2010, 37, 890-898.	2.4	7
141	Algorithmic expedients for the Prize Collecting Steiner Tree Problem. Discrete Optimization, 2010, 7, 32-47.	0.6	11
142	A Minimax Method for Finding the k Best â€Differentiatedâ€Paths. Geographical Analysis, 1997, 29, 298-313.	1.9	34
143	A mixed-integer linear program for optimizing sensor locations along freeway corridors. Transportation Research Part B: Methodological, 2011, 45, 208-217.	2.8	47
144	Finding the most reliable path with and without link travel time correlation: A Lagrangian substitution based approach. Transportation Research Part B: Methodological, 2011, 45, 1660-1679.	2.8	105
145	Generating priceâ€effective intermodal routes. Statistica Neerlandica, 2011, 65, 432-445.	0.9	7
146	Maximum bandwidth broadcast in single and multi-interface networks. , 2011, , .		0
147	Dynamic Programming-Based Column Generation on Time-Expanded Networks: Application to the Dial-a-Flight Problem. INFORMS Journal on Computing, 2011, 23, 105-119.	1.0	22
148	A simulated annealing for multi-criteria network path problems. Computers and Operations Research, 2012, 39, 3119-3135.	2.4	20

#	ARTICLE	IF	CITATIONS
149	A computational study of solution approaches for the resource constrained elementary shortest path problem. <i>Annals of Operations Research</i> , 2012, 201, 131-157.	2.6	6
150	Resilience: An Indicator of Recovery Capability in Intermodal Freight Transport. <i>Transportation Science</i> , 2012, 46, 109-123.	2.6	302
151	Parametric search and problem decomposition for approximating Pareto-optimal paths. <i>Transportation Research Part B: Methodological</i> , 2012, 46, 1043-1067.	2.8	12
152	Path-Constrained Traffic Assignment. <i>Transportation Research Record</i> , 2012, 2283, 25-33.	1.0	92
153	Near Linear Time $(1 + \epsilon)$ -Approximation for Restricted Shortest Paths in Undirected Graphs. , 2012, , .		7
154	A three-stage approach for the resource-constrained shortest path as a sub-problem in column generation. <i>Computers and Operations Research</i> , 2012, 39, 164-178.	2.4	28
155	Multicriteria path and tree problems: discussion on exact algorithms and applications. <i>International Transactions in Operational Research</i> , 2012, 19, 63-98.	1.8	37
156	Optimal Routing with Multiple Objectives: Efficient Algorithm and Application to the Hazardous Materials Transportation Problem. <i>Computer-Aided Civil and Infrastructure Engineering</i> , 2012, 27, 77-94.	6.3	25
157	An oriented spanning tree based genetic algorithm for multi-criteria shortest path problems. <i>Applied Soft Computing Journal</i> , 2012, 12, 506-515.	4.1	28
158	Robust scheduling on a single machine to minimize total flow time. <i>Computers and Operations Research</i> , 2012, 39, 1682-1691.	2.4	67
159	Some heuristic methods for solving p-median problems with a coverage constraint. <i>European Journal of Operational Research</i> , 2012, 220, 320-327.	3.5	13
160	Computing a Most Probable Delay Constrained Path: NP-Hardness and Approximation Schemes. <i>IEEE Transactions on Computers</i> , 2012, 61, 738-744.	2.4	24
161	Complexity analysis and optimization of the shortest path tour problem. <i>Optimization Letters</i> , 2012, 6, 163-175.	0.9	20
162	A global optimization algorithm for solving the minimum multiple ratio spanning tree problem. <i>Journal of Global Optimization</i> , 2013, 56, 1029-1043.	1.1	7
163	Advances in Spatial and Temporal Databases. <i>Lecture Notes in Computer Science</i> , 2013, , .	1.0	0
164	Air cargo scheduling: integrated models and solution procedures. <i>OR Spectrum</i> , 2013, 35, 325-362.	2.1	17
165	BER-based Power Scheduling in Wireless Sensor Networks. <i>Journal of Signal Processing Systems</i> , 2013, 72, 197-208.	1.4	4
166	Fourth party logistics routing problem model with fuzzy duration time and cost discount. <i>Knowledge-Based Systems</i> , 2013, 50, 14-24.	4.0	30

#	ARTICLE	IF	CITATIONS
167	Modern Accelerator Technologies for Geographic Information Science. , 2013, , .		7
168	Fuzzy constrained shortest path algorithm using circumcenter of centroids. , 2013, , .		0
169	Dynamic programming approaches to solve the shortest path problem with forbidden paths. Optimization Methods and Software, 2013, 28, 221-255.	1.6	16
170	Fourth party logistics routing problem with fuzzy duration time. International Journal of Production Economics, 2013, 145, 107-116.	5.1	42
171	A Reference Point Approach for the Resource Constrained Shortest Path Problems. Transportation Science, 2013, 47, 247-265.	2.6	19
172	Implementation of a three-stage approach for the dynamic resource-constrained shortest-path sub-problem in branch-and-price. Computers and Operations Research, 2013, 40, 385-394.	2.4	9
173	On an exact method for the constrained shortest path problem. Computers and Operations Research, 2013, 40, 378-384.	2.4	101
174	Technology adoption and training practices as a constrained shortest path problem. Omega, 2013, 41, 459-472.	3.6	6
175	A survey of resource constrained shortest path problems: Exact solution approaches. Networks, 2013, 62, 183-200.	1.6	100
176	Network protection with guaranteed recovery times using recovery domains. , 2013, , .		3
177	A Bio-Inspired Method for the Constrained Shortest Path Problem. Scientific World Journal, The, 2014, 2014, 1-11.	0.8	12
178	Bicriteria data compression. , 2014, , .		6
179	A Dantzig-Wolfe decomposition algorithm for the constrained minimum cost flow problem. Journal of the Chinese Institute of Engineers, Transactions of the Chinese Institute of Engineers, Series A/Chung-kuo Kung Ch'eng Hsueh K'uan, 2014, 37, 659-669.	0.6	3
180	Passenger trip planning in urban rail transit based on time geography. , 2014, , .		0
181	A fast Lagrangian relaxation algorithm for finding multi-constrained multiple shortest paths. , 2014, , .		1
182	Advances in Communication Networking. Lecture Notes in Computer Science, 2014, , .	1.0	1
183	A note on extending the generic crew scheduling model of Beasley and Cao by deadheads and layovers. Journal of the Operational Research Society, 2014, 65, 633-644.	2.1	2
184	Fast approximation algorithms for routing problems with hop-wise constraints. Annals of Operations Research, 2014, 222, 279-291.	2.6	0

#	ARTICLE	IF	CITATIONS
185	Air Traffic Control Area Configuration Advisories from Near-Optimal Distinct Paths. Journal of Aerospace Information Systems, 2014, 11, 764-784.	1.0	3
186	An A* Label-setting Algorithm for Multimodal Resource Constrained Shortest Path Problem. Procedia, Social and Behavioral Sciences, 2014, 111, 330-339.	0.5	6
187	Energy-aware routing for delay-sensitive underwater wireless sensor networks. Science China Information Sciences, 2014, 57, 1-14.	2.7	11
188	Acceleration strategies for the weight constrained shortest path problem with replenishment. Optimization Letters, 2014, 8, 2155-2172.	0.9	17
190	The Steiner Tree Problem with Delays: A compact formulation and reduction procedures. Discrete Applied Mathematics, 2014, 164, 178-190.	0.5	16
191	Network Route Choice Model for Battery Electric Vehicle Drivers with Different Risk Attitudes. Transportation Research Record, 2015, 2498, 75-83.	1.0	11
192	Shortest feasible paths with charging stops for battery electric vehicles. , 2015, , .		20
193	Stochastic Optimal Path Problem with Relays. Transportation Research Procedia, 2015, 7, 129-148.	0.8	4
194	A study of situationally aware routing for emergency responders. Journal of the Operational Research Society, 2015, 66, 570-578.	2.1	4
195	Computational complexity of convoy movement planning problems. Mathematical Methods of Operations Research, 2015, 82, 31-60.	0.4	4
196	Stochastic optimal path problem with relays. Transportation Research Part C: Emerging Technologies, 2015, 59, 48-65.	3.9	4
197	Finding a risk-constrained shortest path for an unmanned combat vehicle. Computers and Industrial Engineering, 2015, 80, 245-253.	3.4	14
198	A penalty search algorithm for the obstacle neutralization problem. Computers and Operations Research, 2015, 53, 165-175.	2.4	4
199	Constrained shortest path with uncertain transit times. Journal of Global Optimization, 2015, 63, 149-163.	1.1	6
200	Application of Lagrangian relaxation approach to $\hat{\pm}$ -reliable path finding in stochastic networks with correlated link travel times. Transportation Research Part C: Emerging Technologies, 2015, 56, 309-334.	3.9	63
201	Cost-constrained low-carbon product design. International Journal of Advanced Manufacturing Technology, 2015, 79, 1821-1828.	1.5	23
202	Best upgrade plans for single and multiple source-destination pairs. Geoinformatica, 2015, 19, 365-404.	2.0	9
203	Finding Multi-Constrained Multiple Shortest Paths. IEEE Transactions on Computers, 2015, 64, 2559-2572.	2.4	12

#	ARTICLE	IF	CITATIONS
204	Constrained shortest path problems: state-of-the-art and recent advances. , 2015, , .		3
205	A Mobile Application for Real-Time Multimodal Routing Under a Set of Usersâ€™ Preferences. Journal of Intelligent Transportation Systems: Technology, Planning, and Operations, 2015, 19, 149-166.	2.6	16
206	Decision Support for Crew Rostering in Public Transit. , 2015, , .		3
207	Maximum probability shortest path problem. Discrete Applied Mathematics, 2015, 192, 40-48.	0.5	17
208	Metaheuristic based solution approaches for the obstacle neutralization problem. Expert Systems With Applications, 2015, 42, 1094-1105.	4.4	11
209	The Electric Vehicle Shortest-Walk Problem With Battery Exchanges. Networks and Spatial Economics, 2016, 16, 155-173.	0.7	68
210	The Shortest Path Problems in Battery-Electric Vehicle Dispatching with Battery Renewal. Sustainability, 2016, 8, 607.	1.6	7
211	Effective indexing for approximate constrained shortest path queries on large road networks. Proceedings of the VLDB Endowment, 2016, 10, 61-72.	2.1	46
212	Pareto-optimal search over configuration space beliefs for anytime motion planning. , 2016, , .		11
213	Integration of risk in hierarchical path planning of underwater vehicles. IFAC-PapersOnLine, 2016, 49, 226-231.	0.5	16
214	Solving resource constrained shortest path problems with LP-based methods. Computers and Operations Research, 2016, 73, 150-164.	2.4	17
215	Model and algorithm for 4PLRP with uncertain delivery time. Information Sciences, 2016, 330, 211-225.	4.0	33
216	The constrained shortest path problem with stochastic correlated link travel times. European Journal of Operational Research, 2016, 255, 43-57.	3.5	33
217	Intelligent emission-sensitive routing for plugin hybrid electric vehicles. SpringerPlus, 2016, 5, 239.	1.2	0
218	Evacuation planning for disaster responses: A stochastic programming framework. Transportation Research Part C: Emerging Technologies, 2016, 69, 150-172.	3.9	39
219	A dynamic programming approach to integrated assembly planning and supplier assignment with lead time constraints. International Journal of Production Research, 2016, 54, 2691-2708.	4.9	7
221	Multicriteria Analysis in Telecommunication Network Planning and Design: A Survey. Profiles in Operations Research, 2016, , 1167-1233.	0.3	3
222	To save money or to save time: Intelligent routing design for plug-in hybrid electric vehicle. Transportation Research, Part D: Transport and Environment, 2016, 43, 238-250.	3.2	27

#	ARTICLE	IF	CITATIONS
223	QoS Routing Under Multiple Additive Constraints: A Generalization of the LARAC Algorithm. IEEE Transactions on Emerging Topics in Computing, 2016, 4, 242-251.	3.2	6
224	Models and column generation approach for the resource-constrained minimum cost path problem with relays. Omega, 2017, 66, 79-90.	3.6	3
225	A capacitated vehicle routing problem with order available time in e-commerce industry. Engineering Optimization, 2017, 49, 449-465.	1.5	33
226	The multi-criteria constrained shortest path problem. Transportation Research, Part E: Logistics and Transportation Review, 2017, 101, 13-29.	3.7	22
227	Lagrangian relaxation for the reliable shortest path problem with correlated link travel times. Transportation Research Part B: Methodological, 2017, 104, 501-521.	2.8	47
228	A time-delay neural network for solving time-dependent shortest path problem. Neural Networks, 2017, 90, 21-28.	3.3	31
229	Optimal Network Design with End-to-End Service Requirements. Operations Research, 2017, 65, 729-750.	1.2	13
230	Energy-efficient shortest routes for electric and hybrid vehicles. Transportation Research Part B: Methodological, 2017, 103, 111-135.	2.8	55
231	A hybrid Particle Swarm Optimization " Variable Neighborhood Search algorithm for Constrained Shortest Path problems. European Journal of Operational Research, 2017, 261, 819-834.	3.5	111
232	A linear programming based heuristic framework for min-max regret combinatorial optimization problems with interval costs. Computers and Operations Research, 2017, 81, 51-66.	2.4	9
233	Pin Accessibility-Driven Cell Layout Redesign and Placement Optimization. , 2017, , .		34
234	A complementarity equilibrium model for electric vehicles with charging. International Journal of Transportation Science and Technology, 2017, 6, 255-271.	2.0	8
235	Maximizing the overall end-user satisfaction of data broadcast in wireless mesh networks. Journal of Discrete Algorithms, 2017, 45, 14-25.	0.7	7
236	BDD-Constrained A <sup>*</sup> Search: A Fast Method for Solving Constrained Shortest-Path Problems. IEICE Transactions on Information and Systems, 2017, E100.D, 2945-2952.	0.4	1
237	On time dependent routing algorithms for open marketplaces of path services with support for in-advance path reservation. Computer Networks, 2018, 138, 201-212.	3.2	1
238	Unicast QoS Routing Algorithms for SDN: A Comprehensive Survey and Performance Evaluation. IEEE Communications Surveys and Tutorials, 2018, 20, 388-415.	24.8	121
239	Achieving Hybrid Wired/Wireless Industrial Networks With WDetServ: Reliability-Based Scheduling for Delay Guarantees. IEEE Transactions on Industrial Informatics, 2018, 14, 2307-2319.	7.2	27
240	Exact and approximate approaches for the Pareto front generation of the single path multicommodity flow problem. Annals of Operations Research, 2018, 267, 353-377.	2.6	2

#	ARTICLE	IF	CITATIONS
241	Reliable Shortest Path Routing with Applications to Wireless Software-Defined Networking. , 2018, , .		2
242	Hybrid Vehicle Control and Optimization with a New Mathematical Method. IFAC-PapersOnLine, 2018, 51, 201-206.	0.5	0
243	Routing Metrics Depending on Previous Edges: The Mn Taxonomy and Its Corresponding Solutions. , 2018, , .		2
244	A robust optimization approach to multi-interval location-inventory and recharging planning for electric vehicles. Omega, 2019, 86, 59-75.	3.6	28
245	Shortest Feasible Paths with Charging Stops for Battery Electric Vehicles. Transportation Science, 2019, 53, 1627-1655.	2.6	31
246	Lagrangian Relaxation for the Multiple Constrained Robust Shortest Path Problem. Mathematical Problems in Engineering, 2019, 2019, 1-13.	0.6	6
247	Fast Exact Computation of Isocontours in Road Networks. Journal of Experimental Algorithmics, 2019, 24, 1-26.	0.7	1
248	Bicriteria Data Compression. SIAM Journal on Computing, 2019, 48, 1603-1642.	0.8	2
249	Sequential and Parallel Algorithms and Data Structures. , 2019, , .		17
250	Graph Theory and Environmental Algorithmic Solutions to Assign Vehicles: Application to Garbage Collection in Vietnam. SSRN Electronic Journal, 0, , .	0.4	0
251	Targeted optimal-path problem for electric vehicles with connected charging stations. PLoS ONE, 2019, 14, e0220361.	1.1	4
252	Personalized public transport mobility service: a journey ranking approach for route guidance. Transportation Research Procedia, 2019, 38, 935-955.	0.8	5
253	Weight-Constrained Route Planning Over Time-Dependent Graphs. , 2019, , .		9
254	Optimal Risk-Based Group Testing. Management Science, 2019, 65, 4365-4384.	2.4	44
255	Range-Constrained Traffic Assignment with Multi-Modal Recharge for Electric Vehicles. Networks and Spatial Economics, 2019, 19, 633-668.	0.7	13
256	Canadian Traveler Problem with Neutralizations. Expert Systems With Applications, 2019, 132, 151-165.	4.4	3
257	A flexible space-time tradeoff on hybrid index with bicriteria optimization. Tsinghua Science and Technology, 2019, 24, 106-122.	4.1	0
258	Constrained Shortest Path by Parameter Searching. , 2019, , .		1

#	ARTICLE	IF	CITATIONS
259	Joint Caching and Trajectory Design for Cache-Enabled UAV in Vehicular Networks. , 2019, , .		9
260	Multicast routing under quality of service constraints for vehicular ad hoc networks: mathematical formulation and a relax&acircumfix heuristic. International Transactions in Operational Research, 2019, 26, 1339-1364.	1.8	5
261	Algorithms for non-linear and stochastic resource constrained shortest path. Mathematical Methods of Operations Research, 2019, 89, 281-317.	0.4	7
262	An integer optimality condition for column generation on zero&acircumone linear programs. Discrete Optimization, 2019, 31, 79-92.	0.6	2
263	Optimizing resource recharging location-routing plans: A resource-space-time network modeling framework for railway locomotive refueling applications. Computers and Industrial Engineering, 2019, 127, 1241-1258.	3.4	21
264	Metaheuristics for solving the biobjective single&acircumpath multicommodity communication flow problem. International Transactions in Operational Research, 2019, 26, 589-614.	1.8	10
265	Efficient lower and upper bounds for the weight-constrained minimum spanning tree problem using simple Lagrangian based algorithms. Operational Research, 2020, 20, 2467-2495.	1.3	1
266	An efficient exact approach for the constrained shortest path tour problem. Optimization Methods and Software, 2020, 35, 1-20.	1.6	19
268	Finding the nucleolus of the vehicle routing game with time windows. Applied Mathematical Modelling, 2020, 80, 334-344.	2.2	3
269	Route guidance ranking procedures with human perception consideration for personalized public transport service. Transportation Research Part C: Emerging Technologies, 2020, 118, 102667.	3.9	35
270	A Primal Adjacency-Based Algorithm for the Shortest Path Problem with Resource Constraints. Transportation Science, 2020, 54, 1153-1169.	2.6	7
271	Modeling and Engineering Constrained Shortest Path Algorithms for Battery Electric Vehicles. Transportation Science, 2020, 54, 1571-1600.	2.6	18
272	An exact bidirectional pulse algorithm for the constrained shortest path. Networks, 2020, 76, 128-146.	1.6	23
273	Bisection and Exact Algorithms Based on the Lagrangian Dual for a Single-Constrained Shortest Path Problem. IEEE/ACM Transactions on Networking, 2020, 28, 224-233.	2.6	7
274	Optimal UAV Caching and Trajectory in Aerial-Assisted Vehicular Networks: A Learning-Based Approach. IEEE Journal on Selected Areas in Communications, 2020, 38, 2783-2797.	9.7	107
275	A Smart Path Recommendation Method for Metro Systems With Passenger Preferences. IEEE Access, 2020, 8, 20646-20657.	2.6	7
276	Joint chance constrained shortest path problem with Copula theory. Journal of Combinatorial Optimization, 2020, 40, 110-140.	0.8	9
277	An algorithmic approach for finding the fuzzy constrained shortest paths in a fuzzy graph. Complex & Intelligent Systems, 2021, 7, 17-27.	4.0	6



#	ARTICLE	IF	CITATIONS
278	Solving the service-oriented single-route school bus routing problem: Exact and heuristic solutions. EURO Journal on Transportation and Logistics, 2021, 10, 100054.	1.3	1
279	On the shortest $\alpha$ -reliable path problem. Top, 2021, 29, 287-318.	1.1	7
280	Constrained Route Planning over Large Multi-Modal Time-Dependent Networks. , 2021, , .		4
281	Efficient Constrained Shortest Path Query Answering with Forest Hop Labeling. , 2021, , .		10
282	Towards Large-Scale Deterministic IP Networks. , 2021, , .		15
283	Ecological Security Pattern Construction in Karst Area Based on Ant Algorithm. International Journal of Environmental Research and Public Health, 2021, 18, 6863.	1.2	14
284	BiS4EV: A fast routing algorithm considering charging stations and preferences for electric vehicles. Engineering Applications of Artificial Intelligence, 2021, 104, 104378.	4.3	7
285	Heuristics for the Canadian traveler problem with neutralizations. Computers and Industrial Engineering, 2021, 159, 107488.	3.4	2
286	A solution method for the shared resource-constrained multi-shortest path problem. Expert Systems With Applications, 2021, 182, 115193.	4.4	3
287	An Experimental Study on Exact Multi-constraint Shortest Path Finding. Lecture Notes in Computer Science, 2021, , 166-179.	1.0	2
289	CNOP - A Package for Constrained Network Optimization. Lecture Notes in Computer Science, 2001, , 17-31.	1.0	8
290	On Shortest Path Problems with $\alpha$ -Non-Markovian $\alpha$ -Link Contribution to Path Lengths. Lecture Notes in Computer Science, 2000, , 859-870.	1.0	8
291	Shortest path problems with time constraints. Lecture Notes in Computer Science, 1996, , 255-266.	1.0	3
292	Optimal Path Planning in a Threat Environment. Cooperative Systems, 2004, , 349-406.	0.3	10
293	A Parallel Algorithm to Solve Near-Shortest Path Problems on Raster Graphs. , 2013, , 83-94.		2
295	Designing a Backbone Trunk for the Public Transportation Network in Montevideo, Uruguay. Communications in Computer and Information Science, 2020, , 228-243.	0.4	4
296	Construction of Minimum-Weight Spanners. Lecture Notes in Computer Science, 2004, , 797-808.	1.0	9
297	Non-additive Shortest Paths. Lecture Notes in Computer Science, 2004, , 822-834.	1.0	16

#	ARTICLE	IF	CITATIONS
298	Cost-Based Filtering for Shorter Path Constraints. Lecture Notes in Computer Science, 2003, , 694-708.	1.0	29
299	An FPTAS for Quickest Multicommodity Flows with Inflow-Dependent Transit Times. Lecture Notes in Computer Science, 2003, , 71-82.	1.0	4
300	On the Minimum Risk-Sum Path Problem. Lecture Notes in Computer Science, 2007, , 175-185.	1.0	4
302	Sequencing and Counting with the multicost-regular Constraint. Lecture Notes in Computer Science, 2009, , 178-192.	1.0	21
303	An Efficient Algorithm for the Shortest Path Problem with Forbidden Paths. Lecture Notes in Computer Science, 2009, , 638-650.	1.0	2
304	Resource Constrained Shortest Paths with a Super Additive Objective Function. Lecture Notes in Computer Science, 2012, , 299-315.	1.0	6
305	Best Upgrade Plans for Large Road Networks. Lecture Notes in Computer Science, 2013, , 223-240.	1.0	3
306	Duty Scheduling in Public Transit. , 2003, , 653-674.		11
307	Plus court chemin avec d�pendance horaire : r�solution et application aux probl�mes de tourn�es. RAIRO - Operations Research, 1997, 31, 117-131.	1.0	1
308	Constrained shortest path query in a large time-dependent graph. Proceedings of the VLDB Endowment, 2019, 12, 1058-1070.	2.1	20
309	Towards bridging theory and practice. Proceedings of the VLDB Endowment, 2019, 13, 463-476.	2.1	34
310	Integra�o de modelos de localiza�o a sistemas de informa�es geogr�ficas. Gest�o & Produ�o, 2001, 8, 180-195.	0.5	15
311	Deterministic Oversubscription Planning as Heuristic Search: Abstractions and Reformulations. Journal of Artificial Intelligence Research, 0, 52, 97-169.	7.0	14
312	Computational aspects of the optimal transit path problem. Journal of Industrial and Management Optimization, 2008, 4, 95-105.	0.8	6
313	An optimal algorithm for the obstacle neutralization problem. Journal of Industrial and Management Optimization, 2017, 13, 835-856.	0.8	3
315	Routing Military Aircraft With A Constrained Shortest-Path Algorithm. , 2009, 14, .		39
316	Finding Cheapest Deadline Paths. Lecture Notes in Computer Science, 2021, , 476-486.	1.0	0
317	A Method of Network Simplification in a 4PL System. Lecture Notes in Computer Science, 2005, , 279-288.	1.0	2

#	ARTICLE	IF	CITATIONS
318	GEN-LARAC: A Generalized Approach to the Constrained Shortest Path Problem Under Multiple Additive Constraints. Lecture Notes in Computer Science, 2005, , 92-105.	1.0	9
321	P-Median Problems with an Additional Constraint on the Assignment Variables. Operations Research Proceedings: Papers of the Annual Meeting = Vorträge Der Jahrestagung / DGOR, 2011, , 319-324.	0.1	0
322	An Algorithm for Searching Pareto Optimal Paths of HAZMAT Transportation: Efficient Vector Labeling Approach. Korean Society of Hazard Mitigation, 2011, 11, 49-56.	0.1	0
323	Path Problems in Complex Networks. Springer Optimization and Its Applications, 2012, , 279-335.	0.6	0
325	On the Computational Complexity of Policy Routing. Lecture Notes in Computer Science, 2014, , 202-214.	1.0	0
326	Applicability of the Functional Equation in Multi Criteria Dynamic Programming. , 1985, , 189-213.		0
327	On the Construction of the Set of K-best Matchings and Their Use in Solving Constrained Matching Problems. , 1992, , 209-223.		0
328	Compressing Data by Shortest Path Methods. Operations Research Proceedings: Papers of the Annual Meeting = Vorträge Der Jahrestagung / DGOR, 1997, , 145-150.	0.1	0
329	A Study of Situationally Aware Routing for Emergency Responders. , 2016, , 52-82.		0
330	Un estudio sobre algoritmos basados en restricciones: objetivos ingeniería de tráfico y calidad de servicio. Entre Ciencia E Ingeniería, 2017, 11, 103.	0.2	0
331	On Polynomial-Time Combinatorial Algorithms for Maximum L-Bounded Flow. Lecture Notes in Computer Science, 2019, , 14-27.	1.0	1
332	An Index Method for the Shortest Path Query on Vertex Subset for the Large Graphs. Lecture Notes in Computer Science, 2020, , 69-85.	1.0	0
333	Mixed-Integer Linear Optimization: Primal–Dual Relations and Dual Subgradient and Cutting-Plane Methods. , 2020, , 499-547.		2
334	An novel shortest path algorithm based on spatial relations. , 2020, , .		1
335	Eco-routing for Plug-in Hybrid Electric Vehicles. , 2020, , .		4
336	Optimal UAV Caching and Trajectory Design in the AGVN. SpringerBriefs in Computer Science, 2022, , 61-88.	0.2	1
337	Feeder routing for air-to-air refueling operations. European Journal of Operational Research, 2023, 304, 779-796.	3.5	6
338	A Non-Uniform Planar Coil in Electromagnetic Vibration Energy Harvesting for Enhanced Output Power. IEEE Transactions on Magnetics, 2022, 58, 1-10.	1.2	0

#	ARTICLE	IF	CITATIONS
339	Trajectory Optimization for Cellular-Connected UAV Under Outage Duration Constraint. Journal of Communications and Information Networks, 2019, 4, 55-71.	3.5	17
340	A generalized Benders decomposition approach for the mean-standard deviation shortest path problem. Transportation Letters, 2023, 15, 823-833.	1.8	4
341	Network Design with Routing Requirements. , 2021, , 209-253.		1
342	Shortest path with acceleration constraints: complexity and approximation algorithms. Computational Optimization and Applications, 0, , .	0.9	0
343	Multi-constraint shortest path using forest hop labeling. VLDB Journal, 0, , .	2.7	1
344	On Performance of a Simple Multi-objective Evolutionary Algorithm on the Constrained Minimum Spanning Tree Problem. International Journal of Computational Intelligence Systems, 2022, 15, .	1.6	0
345	The structural complexity landscape of finding balance-fair shortest paths. Theoretical Computer Science, 2022, 933, 149-162.	0.5	0
346	A Fast Exact Algorithm for the Resource Constrained Shortest Path Problem. Proceedings of the AAAI Conference on Artificial Intelligence, 2021, 35, 12217-12224.	3.6	2
347	FHL-cube. Proceedings of the VLDB Endowment, 2022, 15, 3112-3125.	2.1	4
348	The resource constrained clustered shortest path tree problem: Mathematical formulation and Branch&Price solution algorithm. Networks, 0, , .	1.6	0
349	An anytime algorithm for constrained stochastic shortest path problems with deterministic policies. Artificial Intelligence, 2023, 316, 103846.	3.9	0
351	Shortest Path Finding in Quantum Networks With Quasi-Linear Complexity. IEEE Access, 2023, 11, 7180-7194.	2.6	3
353	Efficient Navigation for Constrained Shortest Path with Adaptive Expansion Control. , 2022, , .		1
354	Constrained Shortest Path and Hierarchical Structures. Lecture Notes in Computer Science, 2022, , 394-410.	1.0	0
358	Hop-Constrained s-t Simple Path Enumeration on Large Dynamic Graphs. , 2023, , .		1
359	OSCO: An Efficient Segment Routing Scheme for Backup Path. , 2022, , .		0
362	Selective vehicle routing problem with reserved requests and time windows. , 2023, , .		0
366	Learning-accelerated A* Search for Risk-aware Path Planning. , 2024, , .		0

#	ARTICLE	IF	CITATIONS
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